

Application No. 09/894,375

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REMARKS

In the Official Action mailed 10 November 2004, the Examiner reviewed claims 1-8, 10, 13, 14 and 33-35. The Examiner rejected claims 1, 4-7, 10, 13, 14 and 33-35 under 35 U.S.C. §103(a); rejected claim 3 under 35 U.S.C. §103(a); and rejected claims 2 and 8 under 35 U.S.C. §103(a).

No claims are amended. Claims 1-8, 10, 13, 14 and 33-35 remain pending.

The Examiner's rejections are respectfully traversed below.

Rejection of Claims 1, 4-7, 10, 13, 14 and 33-35 under 35 U.S.C. §103(a)

Claims 1, 4-7, 10, 13, 14 and 33-35 are rejected under 35 U.S.C. §103(a) as being unpatentable over Nanis (U.S. Pat. 5,405,646) in view of Sucnaga *et al.* (U.S. Pat. 5,478,657). Reconsideration is respectfully requested.

Applicant submits that at least two elements of the *prima facie* case of obviousness, under the authority of *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991); and MPEP § 2143 - § 2143.03, are not supportable in this record. First, the prior art does not provide teaching, suggestion or motivation to modify Nanis to make the claimed invention. Second, the prior art does not provide teaching or suggestion that there would be a reasonable expectation of success in such a combination. Rather, the Examiner must be improperly relying on Applicant's own application for such teaching.

Applicant first reviews the evidence in the record, including the prior art, the differences between the claims and the prior art, and secondary considerations of non-obviousness. Then, the flaws in the Examiner's *prima facie* case are reviewed.

Prior Art of Record

Nanis (U.S. Pat. 5,405,646)

Nanis describes a process for making magnetic discs using low-cost aluminum substrates which are characterized by "intermetallic inclusions," following the procedure described in the present application. The "intermetallic inclusions" of Nanis cause uneven plating, requiring thick layers of NiP that must be polished off to compensate for the thick plating, thereby increasing the amount of "wct" treatment required for polishing the magnetic disk (see Nanis, column 3, lines 4-11). Nanis reduces the amount of required polishing by applying the process of "vacuum-sputter deposition of a thin metallic layer onto the surface of the substrate" prior to

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the wet chemistry step of electroless NiP plating. The thin metallic layer is selected to bind to the substrate and to nucleate the electroless plating of the nickel alloy in the subsequent wet chemistry step. The process masks the intermetallic inclusions in the aluminum, and results in a smoother layer of NiP than possible in the prior art. The smoother layer of NiP requires less polishing, reducing water consumption and reducing the stream of waste products that require treatment and environmentally acceptable disposal. The problem of adhesion of NiP to aluminum is not a problem addressed in Nanis. Rather, Nanis solves the problems of uneven plating that result from intermetallic inclusions in low quality substrates.

Suenaga *et al.* (U.S. Pat. 5,478,657)

Suenaga *et al.* describes a process for plating titanium substrates with NiP or related materials in order to coat the substrate with a material suitable for texturing. Coating substrates with NiP and related materials is well known in the art for aluminum substrates. However, titanium is known to be difficult to plate because of problems with adhesion due principally to the presence of a tenacious, rapidly formed, thin layer of titanium oxide on the surface of the metal. Thus, Suenaga *et al.* attempts to determine optimum characteristics of a plated NiP layer for use with titanium, where the NiP layer is applied to the titanium "electrolytically and non-electrolytically" (col. 4, lines 65-67). By stating that the NiP is applied "electrolytically and non-electrolytically," Suenaga *et al.* glosses over the actual plating process used in his experiments. Thus, we cannot be sure from the patent exactly what Suenaga *et al.* did. According to Suenaga *et al.*, if the thickness of the NiP layer is correct and the initial roughness of the titanium is not too smooth and not too rough, then the NiP will adhere sufficiently that it will not fall off (exfoliate) during the addition of sputtered magnetic layers. Suenaga *et al.* also requires a certain minimum amount of NiP so that texturing will not scratch through to the underlying titanium.

In fact, the results for adhesion of the NiP are quite mixed in Suenaga *et al.*, suggesting that it is not commercially feasible to simply plate polished titanium with a thin layer of NiP. (See, paragraphs 30-34 of Declaration of Inventor under 37 CFR 1.132, executed 19 October 2004, (hereinafter, the "132 Declaration")) Thus, rather than suggesting that a procedure for masking intermetallic inclusions, such as Nanis, be applied to titanium, Suenaga suggests that the titanium must be smooth to start with, so that NiP can be directly plated onto the titanium surface. Uneven growth of NiP is not mentioned in Suenaga *et al.*, suggesting that they did not even recognize the problem solved by Nanis.

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Differences Between the Claims and the Prior Art

Applicant points out that claim 1 herein distinguishes over Nanis by the step of "providing a metal substrate having a cold worked surface, characterized by microstructural mechanical variations at and below the surface resulting from smoothing processes and with an average surface roughness of less than about 30 Angstroms," and by the discovery recited in the claim 1 that the nickel alloy layer formed by electroless plating in the claimed process has a "surface roughness essentially unchanged from that of the cold worked surface of the metal substrate upon completion of the electroless plating."

The Examiner relies upon Suenaga to supply the missing elements of the claim. Applicant agrees that Suenaga shows a super smooth titanium substrate. Applicant submits however, that there is no suggestion in the art, nor would a person of skill in the art be led to apply, the teaching of Nanis to the substrate in Suenaga *et al*

Secondary Consideration: Unexpected Results

The present invention teaches that the Nanis process reduces polishing of the plated NiP layer required for commercial disks, when a super smooth substrate is used as a starting material. In fact, the surprising results are achieved by applying Nanis to super smooth substrates overcoming problems in the prior art including the carpeting effect. Applicant has provided the 132 Declaration to explain and prove the surprising and unexpected results.

The Examiner appears to give no weight to the declaration stating, "Suenaga *et al.*'s disk substrate would include a Beilby layer and microstructural variations in the metal." Office Action, page 13, lines 13-14. The Examiner also argues that Nanis suggests use of titanium. Again, it is submitted that the Examiner's argument is mistaken. That Nanis suggests use of titanium, along with a host of other metals, does not suggest use of super smooth metal as claimed. The fact that Suenaga *et al.* use a super smooth metal, does not suggest that Nanis would mask the microstructural variations in such metal. The results achieved by the present invention are in fact unexpected, and present a significant improvement in disk manufacturing.

The Examiner's arguments do not address the facts presented in the 132 Declaration, and therefore reconsideration is requested. Even if the *prima facie* case presented by the Examiner were complete, the secondary considerations set forth in the 132 declaration would overcome it. See, *In re Merchant*, 575 F.2d 865; 197 U.S.P.Q. 785 (CCPA, 1978).

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*Prima Facie Case of Unpatentability*

Although the Examiner's argument does include basis for his position that the combination of Nanis with the super smooth titanium in Suenaga *et al.* would yield the present invention, it fails in two other elements of the *prima facie* case: motivation to combine and reasonable likelihood of success.

**Motivation to Combine**

As to the motivation element of the *prima facie* case, the Examiner argues "The motivation providing a substrate with a smooth surface roughness is that it allows it to be plated with a highly adhesive layer. (Column 2, lines 47-51)." See, Office Action, page 6, lines 15-16. The Examiner is mistaken in his reasoning. Suenaga *et al.* teaches plating NiP directly on the substrate, without intervening layers, and shows mixed results for adhesion as discussed above. Nanis does not plate NiP directly on the substrate at all, in direct contrast to Suenaga *et al.* Nanis applies intervening layers to mask intermetallic inclusions. There is no reason to believe that a person having skill in the art would apply the substrate of Suenaga *et al.* to the process of Nanis, in order to achieve improved adhesion of the substrate to the plated NiP.

The problem solved by Nanis is not adhesion. To the contrary, Nanis solves the chemically and physically distinct problem of uneven growth of NiP in electroless plating due to intermetallic inclusions, and suggests that one could start with a lower cost substrate, that can be manufactured without expensive techniques to avoid such inclusions. (See Nanis, column 3, lines 64-68).

Suenaga *et al.* does not mention this problem of uneven growth, and does not appear to observe the problem at all. Rather, Suenaga *et al.* suggests that NiP should be plated in a very thin layer directly on titanium, without intervening layers. Suenaga *et al.* purports to have determined the right surface roughness for the substrate and the right thickness of the NiP to support adhesion and texturing for directly plating NiP on a titanium substrate. Since Suenaga *et al.* suggest plating directly on the titanium surface with narrow specifications of roughness for adhesion, and Nanis suggests applying intervening layers for masking of inclusions, before plating, one is lead to the conclusion that the two processes are incompatible. Neither Nanis nor Suenaga *et al.* suggests that it would be reasonable to apply their respective teaching to the other for any purpose.

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Going one step further, the problem solved by the present invention is the "carpcting" effect observed when plating NiP on super smooth aluminum, due to microstructural variations in the substrate surface. Neither Nanis nor Suenaga *et al.* recognizes this problem, and neither suggests that it would be reasonable to apply their combined teaching to mask microstructural variations in the surfaces of super smooth substrates.

#### Reasonable Expectation of Success

As to the reasonable expectation of success element of the *prima facie* case, the Examiner provides no comment. Applicant has pointed out in the 132 Declaration facts establishing that persons of skill in the art would not be led to have a reasonable likelihood of success in applying Nanis to a super smooth substrate. The microstructural variations caused by polishing aluminum and other metals are a problem not encountered until recently in the disk drive industry, and present a completely different physics than the uneven growth caused by inclusions of impurities discussed in Nanis. There is no reason provided by the Examiner that one would reasonably expect that the process of Nanis can be applied to solve the problems encountered with super smooth substrates, as claimed herein. Suenaga *et al.* certainly does not provide such suggestion, and the Examiner does not comment on it.

Accordingly, reconsideration of the rejection of claims 1, 4-7, 10, 13, 14 and 33-35 is respectfully requested.

#### Rejection of Claim 3 under 35 U.S.C. §103(a)

Claim 3 is rejected under 35 U.S.C. §103(a) as being unpatentable over Nanis in view of Suenaga *et al.* as applied to claims 1, 4-7, 10, 13, 14 and 33-35 above, and further in view of Ross *et al.* (U.S. Pat. 5,980,997).

Claim 3 depends from claim 1, and is patentable for at least the same reasons.

Accordingly, reconsideration of the rejection of claim 3 is respectfully requested.

#### Rejection of Claims 2 and 8 under 35 U.S.C. §103(a)

Claims 2 and 8 are rejected under 35 U.S.C. §103(a) as being unpatentable over Nanis in view of Suenaga *et al.* as applied to claims 1, 4-7, 10, 13, 14 and 33-35 above, and further in view of Ishitobi *et al.* (U.S. Pat. 6,152,976).

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Claims 2 and 8 limit the invention to use of an aluminum alloy substrate. It is well known that aluminum plating properties are quite different than those of titanium, and the teachings of Suenaga *et al.* are not relevant to this specific class of substrate material. See, Suenaga *et al.* column 1, lines 10-20 and column 1, line 53- column 2, line 16. The Examiner relies on Ishitobi *et al.* to suggest the claim limitation to super smooth aluminum.

It is submitted that the Examiner is mistaken. Ishitobi *et al.* does not describe a super smooth aluminum substrate prior to deposition of NiP or other materials. On the contrary, Ishitobi *et al.* is directed to polishing a substrate that already includes the NiP layer. See, column 1, lines 19-24; column 5, line 40-44; and column 7, line 51-54. The Examiner's citations to column 5, lines 34-40, and 49-53 are mistaken. The "substrate" referred to in Ishitobi *et al.* is aluminum "after plating with NiP ..." or other material, as stated at column 5, lines 39-44. Thus, the Examiner is referring to a reference which teaches smoothness after polishing the NiP, not before depositing it as required herein. When the Ishitobi *et al.* reference is considered as a whole, it is clear that it teaches polishing after plating of the Ni-P layer, and therefore is not relevant to the present invention.

Accordingly, reconsideration of the rejection of claims 2 and 8 is respectfully requested.

### CONCLUSION

It is respectfully submitted that this application is now in condition for allowance, and such action is requested.

The Commissioner is hereby authorized to charge any fee determined to be due in connection with this communication, or credit any overpayment, to our Deposit Account No. 50-0869 (NANS 1000-2).

Respectfully submitted,

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